

Appl. No.: 10/608,580  
Amdt. Dated: January 4, 2007  
Reply to Office Action of: November 8, 2006

### **REMARKS/ARGUMENTS**

#### **1. Claims**

Claims 1, 4, 6, 13, 26 and 30 remain in this application. Claims 5, 9-12 and 27-29 were previously withdrawn as a result of an earlier restriction requirement, with reservation of applicants' right to present the claims in a divisional application.

#### **2. Drawings**

The Examiner has not indicated in the accompanying form PTO-948 that the formal drawings previously submitted have been approved. However, without specific rejection from the Examiner, Applicants will deem they have been approved.

#### **3. 112 Rejections**

The Examiner has rejected claims 1, 4, 6, , 13, 26, and 30, under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out or distinctly claim the invention. In particular, the Examiner complains of and rejects applicants' use of the phrase "suitable for photonic devices" stating that there is no guidance of definition in the specification that would allow one of ordinary skill in the art to understand the meaning of the words. The Examiner also complains and rejects the phrase on the grounds that applicants' invention would not be suitable for making "all photonic devices" [Office Action, page 2, last paragraph, lines 8-9] giving as an example a halide based IR device..

Applicants traverse the rejection.

First, applicants' specification, Paragraph [0022], lines 14-16, clearly state that the teachings of the present invention can be used to make photonic devices having a smaller variation in [refractive] index. Subsequent Paragraphs [0023] to [0027] describe the materials that can be used for making the doped glass films of the invention. Finally, Paragraph [0028] states that chemical vapor deposition methods as well as flame hydrolysis deposition processes can be used "to yield films suitable for photonic devices." [Emphasis added]. Subsequently, from Paragraph [0030] to Paragraph [0041] applicants gives examples embodying the invention.

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**Therefore**, in view of the foregoing cited paragraphs of the specification, applicants submit that the invention as described in claim 1 is fully supported by the specification and would be clearly understood by one skilled in the art.

**Second**, regarding the Examiner's statements that applicants' method would not be suitable for making photonic devices such as halide-based IR devices, applicants submit that this rejection should be withdrawn. Since neither the specification nor claims 1 and 26, the two independent claims, indicate that halogen-containing materials are used in practicing the invention the Examiner's comment is believed misdirected and should be withdrawn. Further, it would be obvious to one skilled in the art the method as described in the specification and claimed in the claims is directed to, and would be understood by one skilled in the art as being directed to, the deposition of metal oxide films containing silicon and the metals as described in the invention.

**Consequently**, in view of the foregoing facts and arguments applicants respectfully submit that it is proper for the examiner to withdraw the §112, second paragraph, rejection of claims 1, 4, 6, , 13, 26, and 30.

#### **4. § 102 Rejections**

The Examiner has rejected claims 1, 4, 13, 26, and 30 under 35 U.S.C. § 102(b) as being anticipated by Adams, U.S. Patent No. 3,582,395 for reasons set forth in the Office Action. In particular applicants note that in the Office Action the Examiner deems the Adams material "as suitable for bonding to photonic devices."

Applicants traverse the rejection

**First**, Adams does not teach anything about photonic devices (applicants' claim 1) or planar waveguides (applicants' claim 26). Adams teaches protective coatings.

**Second**, while the Adams patent teaches the use of alkylsilyl titanates *to prepare a scratch resistant surface*, Adams does not teach depositing a doped glass suitable for photonic devices on the surface of a substrate as claimed in applicants' claims 1 and 26.

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Adams teaches treating a surface with an alkyl silyl titanate using a "spray pyrolysis" method in which an alkylsilyl titanate *in a solvent* is sprayed onto a heated surface as described in his claim 1 and the specification in column 2, lines 44-46 column 5, lines 14-17. The presence of the solvent and the reason for its presence is indicated in Adams at column 2, line 68, to column 3, line 9. The solvent is atomized during delivery, but does not evaporate until contacted with the heated surface. In applicants' invention the alkylsilyl titanate used as a "neat" material and is not used in the presence of a solvent. *The difference is important* because the presence of a solvent such as described by Adams can lead to polymerization of an alkylsilyl titanate (zirconate) moiety and/ or affect the optical properties of the deposited glass such that it is not suitable for photonic applications. As indicated in applicants' specification, Paragraph [0002], lines 3-7, planar photonic devices require precise control of the refractive index of the deposited glass films.

**Third**, in general, spray pyrolysis refers to atomizing a solution containing a precursor compound onto a heated substrate. Evaporation of solvent takes place both in the aerosol, and on the surface. Precursor compound is transported as an aerosol (i.e. liquid), and is thermally reacted to form the compound of interest by the hot substrate. Spray pyrolysis is employed because it is cheap. *However, the films it makes are not suitable for photonic devices. They are rough due to the impingement of aerosol droplets, and they nearly always contain impurities from the solvent and incomplete pyrolysis of the precursor including the solvent. The impurities create optical absorption and localized changes in refractive index, and the roughness causes scatter. All of these contribute to optical losses which make spray pyrolysis unacceptable for photonic devices.*

**Fourth**, The Adams patent is directed to scratch resistant coatings for glass objects (see Abstract). There is no mention that a layer of the Adams coating has use in a photonic application, for example as either a waveguide or a cladding. In fact, for the reasons discussed above, the Adams coating would not be for such uses. In contrast to Adams the present invention, throughout the specification, is directed to photonic devices.

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**Fifth**, in making comments on applicants' response to a prior Office Action the Examiner stated that because applicants use the word "comprising" in the base claims, the claims are open to the use of a solvent. Applicants traverse,

In the application the two independent claims are claims 1 and 26. The other pending claims depend on one or the other of these either directly or indirectly through another dependent claims. In the base claims the word "comprising" is used in conjunction with the steps involved in practicing the invention. In each independent claim applicants recite reacting or using "a precursor compound of the formula  $(R_3SiO)_jM(OR')_k$  to deposit a doped glass layer on the surface of a substrate." Reading the claims and the foregoing recitation in the light of the specification, one cannot conclude, as the Examiner has erroneously done, that the use of compound of the formula  $(R_3SiO)_jM(OR')_k$  can include the use of a solvent. *Nowhere in the present application do applicants describe diluting compounds of the formula  $(R_3SiO)_jM(OR')_k$  with a solvent.* Applicants submit that in the absence of statement that a solvent can be used it is improper for the Examiner to conclude that a solvent can be used.

**Sixth**, the language of applicants' claims 1 and 26, the independent claims, are directed to glass layers suitable for photonic devices (claim 1) and planar waveguides (claim 26). These uses require glass layers that do not hinder the transmission of light through the glass. The *coatings* of Adams can contain materials from the solvent or other added materials that would result in a glass that can incur high transmission losses. For example, Adams' Table in column 4, lines 62-71, and both indicate water can be added to titanium alkylsilyloxide described therein. Example 5 (column 4, line 74; to column 5, line 12, indicates that 0.65 mole of water can be added to 1 mole titanium-bis-trimethyl-silyloxide-bis-isopropoxide and that 1.96 moles of water can be added to a solution of titanium tetrakis-trimethyl-silyloxide. If the solutions described in the Table and Example 5 were used to prepare photonic devices and waveguides the resulting products could contain a large number of hydroxyl (-OH) groups that absorb light and thus reduce transmission. Such products would be unsuitable for use in photonic devices and waveguides.

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Seventh, the Examiner has combined Imoto, US 4,856,859, and Miyazaki, US 5,882,317, with Adams for purposes of indicating that Adams "'device" could be considered a waveguide (see office Action, page 4, last paragraph, lines 1- 3, re Imoto) and that heating and cooling are part of the lithographic process (see office Action, page 4, last paragraph, lines 3-5, re Miyazaki). Applicants submit that this is improper because any rejection under §102 must be made using a single reference. The Examiner's inclusion of Imoto and/or Miyazaki results in a combination.

Notwithstanding the fact that applicants believe the citation of Imoto and Miyazaki is improper, the citation of Imoto or Miyazaki would not result in any anticipation or obviousness because Adams does not refer to waveguide/photonic uses; the materials of Adams are unsuitable because they include a solvent and would be particularly unsuitable if water were added as explained above.

Eighth, Adams teaches scratch resistant coatings. There is nothing in Adams, no teaching, no suggestion and no inference, indicating that the scratch resistant coatings are suitable for photonic devices or as planar waveguides. Applicants submit that in the absence of any such teaching, suggestion or inference Adams cannot be taken as anticipating applicants' invention.

Therefore, in view of the foregoing facts and arguments, applicants respectfully submit that Adams does not anticipate the claimed invention and that it is proper for the Examiner to withdraw the §102(b) rejection of claims 1, 4, 13, 26, and 30.

#### **5. § 103 Rejections**

The Examiner has rejected claim 6 under 35 U.S.C. § 103(a) as being unpatentable for obviousness over Adams, 3,582,395 as applied to claim 1, and further in view of Antos 5,296,012 and Blackwell 5,154,744. Claim 6 is a dependent claim depending on and further limiting claim 1. Claim 1

Applicants traverse the rejection.

Applicants submit that Adams does not teach or suggest what is claimed in claim 1 for all the reasons stated above in the traverse of the §102 rejection, which reasons are incorporated herein by reference. In particular, as applicants have pointed out

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in detail, in addition to Adams not teach or suggesting photonic devices (Adams teaches the formation of scratch resistant coatings) and Adams requires the use of a solvent to form the coating described therein (which lead to other problems as explained above and below). Adams does not teach or suggest that pure alkylsilyl titanates can be used in any process, but teaches that the alkylsilyl titanates are used with a suitable solvent to prevent polymerization or condensation reactions from occurring. The use of a solvent is anathema in the formation of planar devices for reasons discussed above. Further, nowhere in applicants specification or claims is there any indication that a solvent is used in applicants' process. In the absence of any such teaching or suggestion within applicants' specification applicants submit that any inference by the Examiner that such solvent can be used it improper and unwarranted.

Antos teaches the use of a multiple burner system using metal chlorides in a CVD process and does not teach or suggest that compounds other than metal chloride are suitable for the PECVD process described therein. Antos teaches that one of the reasons for using a multiple burner system is to prevent incompatible components from contacting one another prior to oxidation because of the formation of particulates in the vapor transport lines (column 4, lines 2-5). Adams discusses the formation of polymerized or condensed species formed as a result of using the organometallic/solvent mixture described therein. Consequently, the problem Antos seeks to avoid could occur using the alkylsilyl titanates of Adams.

Finally, combining Blackwell with Adams and Antos does not teach the claimed invention. Blackwell teaches the use of pure titanium alkoxides to prepare titania-doped fused silica. Given that the materials must be transported through delivery lines to burners, the materials of Adams, which are solutions, could polymerize and plug up the transport lines. Adams does not teach the preparation and use of anhydrous materials. Consequently, combining Blackwell and Adams in the process of Antos would not result in the claimed invention.

Therefore, In view of the foregoing facts, applicants submit that, at a minimum, claim 6 is patentable over the art of record by reason of depending on, and further limiting, a base claim that is patentable over the art of record.

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## 6. Conclusion

Based upon the above amendments, remarks, and papers of records, applicant believes the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Applicant believes that no extension of time is necessary to make this Reply timely. Should applicant be in error, applicant respectfully requests that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this Reply timely, and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Please direct any questions or comments to Walter M. Douglas at 607-974-2431.

4 January 2007  
Date

<p><b>CERTIFICATE OF TRANSMISSION</b> <b>UNDER 37 C.F.R. § 1.8</b></p> <p>I hereby certify that this paper and any papers referred to herein are being transmitted by facsimile to the U.S. Patent and Trademark Office at 571-273-8300 on:</p> <p><u>4 January 2007</u> Date</p> <p><u>Walter M. Douglas</u> <u>4 January 2007</u> Walter M. Douglas Date</p>
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